THE INTERNET
AND YOUR BUSINESS

Companies like GE, IBM, and J.P. Morgan are on the Internet, that web of 25,000 computer networks connected worldwide. You should be there too. Here's what to expect. ■ by Rick Tetzeli

CALL 1993 the year of the announcement. Ambitious corporations bellied up to the publicity bar, bragging about the billions of dollars they would spend delivering something called the "information superhighway," which will arrive at your doorstep in 1995 or 1996 or 1997 or 1998 . . .

Meanwhile, a surprisingly wide range of other companies, including General Electric, IBM, J.P. Morgan, Merrill Lynch, Motorola, Schlumberger, and Xerox, are making use of the information highway that already exists: the Internet, a global web of 25,000 computer networks. The Internet is more than a two-lane version of the "real thing." While the information superhighway generated only publicity last year, the Internet more than doubled in size—an estimated 20 million people now have access. According to Anthony Rutkowski, vice president of the Internet Society, a volunteer group that promotes Internet use, three-quarters of that growth came from newly registered commercial networks. Of the networks registered worldwide, 63% belong to businesses or their research labs. The next category, with 10%, is university labs.

So companies are signing on, and fast. But why? After all, the Internet is difficult to negotiate, because you generally need to know commands in Unix, computer software familiar mainly to researchers and nerds. Information is hidden away in news groups with strange names like *comp.humanfactors* or at network locations like *wuarchive.wustl.edu*. There's no comprehensive directory and less privacy than you'd like—certainly not enough to safeguard sophisticated financial transactions.

What's more, nobody really runs the thing. The Internet's lack of a command center reflects its origin, in 1969, as a Defense Department network designed to survive nuclear attack. Rather than route messages through central (and therefore bombable) control points, the network makes use of thousands of computers linked by thousands of different paths. Each message carries an address that lets

JAMES GLEICK / THE PIPELINE
■ The author of *Chaos* is helping to bring order to the Internet with software that makes it easier to use.

any of the computers forward it toward its destination. Messages usually arrive in seconds, but on rare occasions they vanish into cyberspace; their senders have little choice but to try again. Says Ken McGee, a vice president with the Gartner Group consulting firm in Stamford, Connecticut: "When something goes wrong on the Internet, what are you going to do? Call 1-800-Al-Gore?"

But connecting your corporate network to this high-tech maelstrom is neither fool-

ery nor faddishness. Mary Cronin, a Boston College professor and author of the book *Doing Business on the Internet*, says there are short-term and long-term reasons for hooking up: "Businesses want the Internet to provide x, y, and z right away. It can. But the most compelling argument for connecting is that the Internet is the biggest and earliest manifestation of the way business is going to be conducted from now on. Networked information and communication are the standard for the future."

Companies testing the waters boast of increased productivity, better collaboration with strategic partners, and access to what is in essence the world's largest public library for a seemingly infinite range of information. But the Internet is virgin territory when it comes to true commerce. While start-up companies are experimenting with interesting forms of electronic marketing and advertising, most large companies have just begun to see the Internet as a potential marketplace.

James Gleick, the author of *Chaos*, a best-seller about the history and meaning of chaos theory, supplies businesses and consumers with access to the Internet via a new service in New York City called the Pipeline. "This is an exploding trend," he says. "It's as if every business in the world woke up yesterday and saw this great universe out there. They all want in, even if they don't know what it means." Forget the hype for a moment. Here's a look at what it means to be on the Internet today.

■ **ELECTRONIC MAIL:** Most of the corporate traffic that crosses the Internet is E-mail; being able to zap messages to a computer anywhere in the world is a big reason for getting on. Says David Sims, director of the information network at Schlumberger: "I hardly use the telephone

PHOTOGRAPHS BY CHRIS BUCK

anymore." When contacted via Internet E-mail for this story, Sims responded in kind: It was more convenient than trying to link up by phone from his hotel in Islamabad, Pakistan.

Other corporate users are equally devoted. Mort Meyerson, CEO of Perot Systems, sends and receives more than 7,000 Internet E-mail messages a month. IBM

little ambivalent about saying this, but E-mail is more secure because it doesn't just lie around the office, and it saves you the added step of having to go pick it up. Fax won't be replaced, but in ten years there won't be many companies that don't have every single employee with E-mail on the Internet."

Businesses go to great lengths to make

station, and his E-mail can be read by any recipient with a Macintosh or PC.

According to Sims of Schlumberger, the thread that connects the halves of his $6.8-billion-a-year company—oil and gas services and the manufacturing of gas and water meters—is the acquisition and exchange of information. Twenty thousand of Schlumberger's 50,000 employees routinely use E-mail, and many depend on the Internet to communicate with customers, suppliers, and university researchers. Demand is so great that in 1992 Sims had to expand the company's direct line to the Internet to handle 12 times as much volume.

■ **COLLABORATION:** When IBM does development work with other companies, its engineers often use the Internet to communicate with their counterparts rather than set up a private link. Says Nick Trio, IBM's Internet "postmaster," who maintains the company's network connection: "To be technologically vital these days, you have to be on the Internet." Software engineers in Hawthorne, New York, for example, are collaborating with developers at Bellcore in New Jersey. Instead of driving to one another's labs, the researchers use the Internet to log on to a shared workstation at Bellcore.

Clearly, there's risk in linking your corporate network to the public world of the Internet. Companies take elaborate precautions, most often by setting up special workstations as buffers. These so-called firewalls vet incoming messages and make sure that an outsider authorized to access a certain computer in the company doesn't roam anywhere else or leave software that records confidential information, such as people's passwords. At IBM, traveling employees are issued smart cards that identify them to the firewall. IBM tests the security system annually, challenging its own programmers to ferret out problems. Last year only one employee found a bug; he won a book on Unix programming. This year Big Blue is really putting out: Anyone who finds a bug wins a $150 dinner for two. But since 145 attempts so far have failed to crack the system, Trio says he should be entitled to the prize.

No one doubts that collaboration via the Internet will increase. GE's Greg Casagrande, information systems manager for corporate R&D, thinks speedier connections will make sharing multimedia—text, graphics, video, and audio—the norm. As network capacity increases, says Casa-

AMANDA WALKER / INTERCON SYSTEMS
■ **"Net Goddess" Walker is a cybermarketer and Beauregard is a hyacinth macaw.**

employees exchanged 580,000 messages with outsiders in January. Researchers at GE's corporate R&D division send and receive 5,000 messages a day. Ronald Richard, a senior executive in Panasonic's U.S. R&D operation, uses E-mail to stay in touch with seven U.S. labs, many of his suppliers and customers, parent company Matsushita's Japanese labs, and his secretary, who's 20 feet from his desk. Says Richard: "We make fax machines, so I'm a

their networks compatible with TCP/IP, the Internet standard for addressing messages and sending data. Paul Weekes, Motorola's director of information technology management, has masterminded a sweeping five-year effort to build a high-speed backbone for Motorola's internal networks and make all communications Internet-compatible. The result is that E-mail runs seamlessly inside and outside the company. Weekes, for example, uses a Next work-

grande, it will be easier for doctors at hospitals with Internet connections to consult faraway specialists by transmitting 3-D brain scans that can be rotated and examined onscreen. That could help spur business for the GE unit that makes scanners.

■ INFORMATION GATHERING:

Try as you may, you cannot imagine how much data is available on the Internet. Brian Johnson of White Plains, New York, is a so-called Internet guide who earns $100 an hour teaching corporations to navigate and mine the Net. Says he: "I remember standing in my backyard in Arkansas as a kid, watching a satellite go by. Now I can pull down a photo that was made by a satellite 30 minutes after it's taken." NASA stores such photos in digital format on a computer that anyone on the Internet can access.

Thousands of Internet news groups and E-mail lists are filled with experts discussing their fields. There are groups on chemical engineering, Middle Eastern politics, semiconductor manufacturing, and educa-

GREG CASAGRANDE / GENERAL ELECTRIC

■ He helps corporate researchers use the Internet to stay in touch with colleagues at hospitals that operate GE scanners.

tion (and on pets, movies, sex, cooking, humor, and the Boy Scouts). Users can tap into computers from institutions as diverse as the Nasdaq, the Federal Reserve, and the Library of Congress.

That's the good news. Says Pipeline's James Gleick: "When I first discovered the Internet, it was like a whole new world opening up." But he adds: "It was

horrifying how difficult it was." Imagine doing research at a vast archive with thousands of incomplete catalogues and no librarian.

Gleick is one of a few entrepreneurs striving to make the Internet more accessible. Pipeline subscribers get PC software that eliminates the need to learn mind-numbing commands like *ftp ftp.eff.org.* (It means "I'm interested in retrieving files offered by the Electronic Frontier Foundation.") Instead, subscribers can get started on the Internet with the help of point-and-click graphics that resemble the familiar Windows interface.

The big breakthrough in making the Internet navigable is a more versatile program called Mosaic. Developed at the National Center for Supercomputing Applications (NCSA) in Champaign-Urbana, Illinois, and distributed free to any Internet user who requests it, Mosaic lets people click and point their way to the information they want via something called the World Wide Web. Like a multimedia encyclopedia, the

STRAIGHT TALK ABOUT THE INTERNET

What is the Internet?

The Internet is a loosely configured, rapidly growing web of 25,000 corporate, educational, and research computer networks around the world. It evolved from an R&D communications network created by the Defense Department in 1969 and designed to survive nuclear war. The Internet has no central computer; instead, each message you send bears an address code that lets any computer in the Net forward it toward its destination.

Who manages it?

"There is no Internet Inc.," writes Ed Krol, author of *The Whole Internet Catalog & Users Guide.* The closest thing to a governing body is the Internet Society in Reston, Virginia. This volunteer organization, with more than 2,000 individual and 84 corporate members, promotes Internet use and over-

sees development of new communication protocols.

Isn't the Internet noncommercial?

Portions are. The National Science Foundation Network, which is the main artery for research and education traffic, bans commercial data. Companies that market Internet access generally make sure customers' data pass through privately owned segments of the Net.
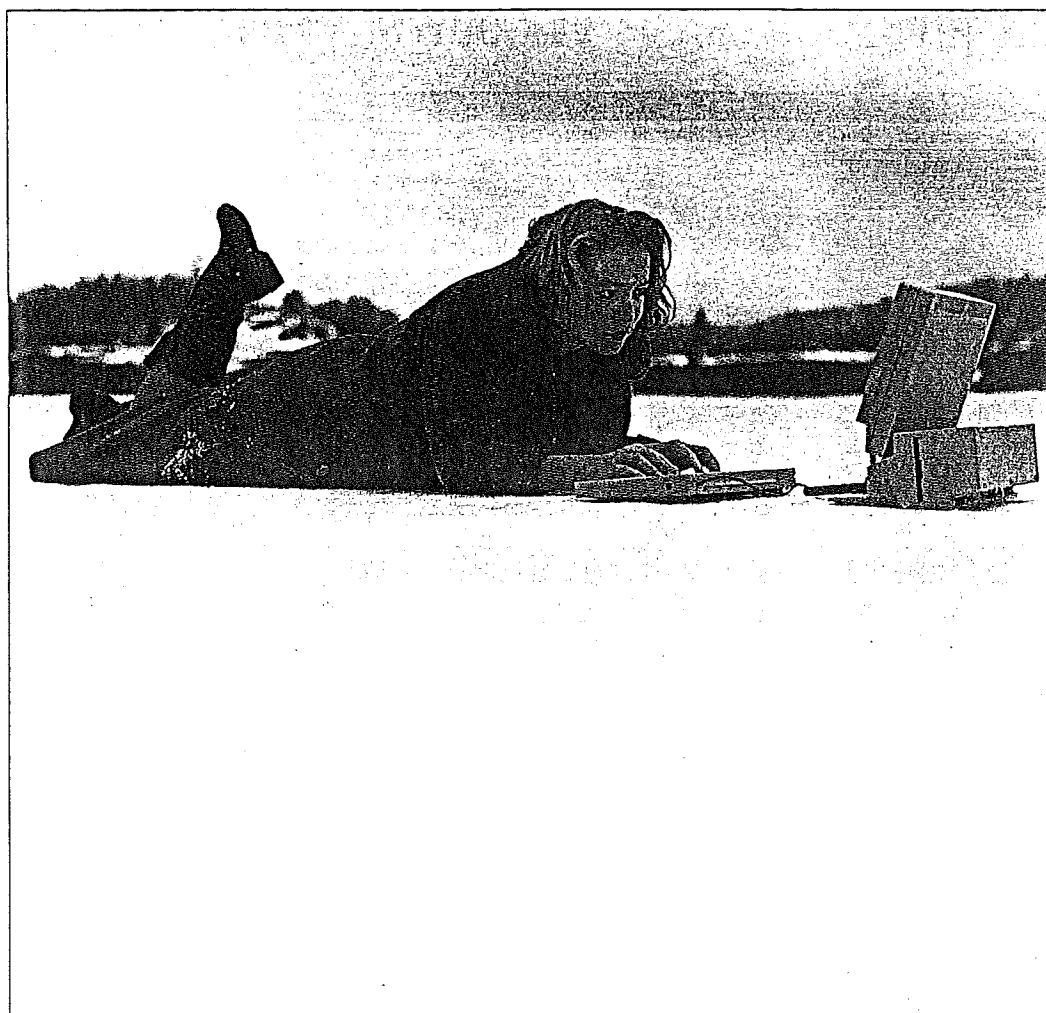
How do I get on?

Anybody with a computer and a modem can get on the Net for around $20 per month, plus phone charges, by subscribing to a gateway company like the World in Boston. For corporations that want to connect their network to the Internet, providers like Global Enterprise Systems in Princeton, New Jersey, lease dedicated lines. Such a setup, including a "firewall" computer for security and

software to ensure that your network meshes with the Internet, costs $50,000 and up, not counting the expense of personnel to maintain the connection. Howard L. Funk, an ex-IBMer who pushed Big Blue to get on the Internet, says the company spends about $2 per user per month.

Will I hit electronic traffic jams?

Traffic is part of life. So many people are joining dial-up services like America Online, whose offerings include E-mail access to the Internet, that you sometimes get a busy signal. On the Internet itself, jams occur when thousands of people simultaneously try to tap into a particular computer, such as one in Illinois that offers free copies of popular Mosaic software. Congestion is also likely in data transmission circuits. Providers are rushing to add capacity; whether they'll keep pace with demand is uncertain.

financial transactions is years off. "Put it this way," says Miller. "You'd rather pay your bills over it than receive your paycheck over it."

■ **DIRECT MARKETING:** You can just imagine the direct-mail crowd licking its lips at the prospect of the Internet: 20 million people who have sorted themselves into interest groups, from theologians to auto repair hobbyists. Better yet, distributing junk mail electronically is lots cheaper than via "snail mail" (the U.S. Postal Service).

So why not barrage these consumers? Because they can answer back. Says Apple Computer postmaster Erik Fair: "A traditional junk mailing is successful if it gets a response rate of 2% or 3%. On the Internet, you'll get 100% response. And 99% of it will be 'Don't you ever do this to me again!'" Catalogue companies that have sent material to potential customers in Internet groups have been so heavily barraged by negative feedback that they have promised not to do it again.

InterCon Systems, in Herndon, Virginia, is perfecting a less intrusive approach that vice president Brian Lichorowic calls cybermarketing. The company, a maker of Internet software for PCs and Macs, has a reputation for providing excellent customer support via

LAURA FILLMORE / ONLINE BOOKSTORE
▟ Through Fillmore's store, you can get books like *Sex: An Oral History* delivered into your computer.

Web, which was developed by researchers in Geneva, Switzerland, consists of disparate files and directories spread throughout the Internet and connected with so-called hypertext links. By clicking on "koala" in one electronic document, for example, a Mosaic user might connect to a computer with more information in Sydney, Australia. A few more clicks, and you're perusing files and photos stored digitally in that machine.

Anthony Rutkowski of the Internet Society calls Mosaic "the Internet killer application"—software that will make the Net indispensable, just as Lotus 1-2-3 did the IBM PC. When Mosaic's developers introduced Mac and PC versions in November, the NCSA was swamped with some 10,000 takers per week. Many Internet habitués blame the use of Mosaic for the traffic jams that occasionally slow communication on the Net.

At J.P. Morgan, Peter A. Miller, managing director and co-head of technology, and David Spector, a vice president, are using Mosaic to make Internet accessible to every employee. What on the Internet can bankers possibly find of interest? Here are just a few examples, drawn from the *Internet Letter*, published by Jayne Levin in Washington, D.C.: SEC filings, Commerce Department data including requests for bids and Census Bureau information, new patent titles, stock market updates, and the trade journal *Nasdaq Financial Executive*. Another resource: professors, who increasingly publish and take part in discussion groups on the Net.

Asked if J.P. Morgan conducts financial transactions on the Internet, Miller recoils in horror. Financial firms linked to the Internet, such as Morgan and Merrill Lynch, have a group that discusses networking issues, but using the Net for trading or other

the Net. Most InterCon developers spend several hours a week tracking news groups on computer-related topics. They'll respond to any posted query they can answer—whether or not the question, or the answer, has anything to do with InterCon products.

Around the office, developer Amanda Walker is known as the Net Goddess. She gets fan mail about her postings, which are calm, smart, and refreshingly free of technobabble. One man liked her style so much that he said he'd even be eager to read her description of how to boil an egg. Walker says her popularity helps win customers: "This works kind of like show business or sports marketing. Personal impressions and endorsements carry a lot of weight." InterCon's sales have more than doubled in each of its five years of existence.

Another form of electronic marketing is

catching on among larger companies. Apple, Bell Atlantic, IBM, Schlumberger, and Silicon Graphics operate special computers, known as servers, that make available product information, press releases, E-mail directories, and financial data. Digital Equipment goes a step further. It has hooked two of its new high-performance Alpha computers to the Internet and lets people test-drive the systems remotely by running their own software on the machines. Over 2,500 potential customers have logged on during the past six months. Says Gail Grant, who manages the servers: "Customers love the program because there's no salesman breathing down their necks."

She came up with this vision for marketing in the high-tech Nineties in true Nineties fashion, sharing beers one afternoon with co-workers in a Palo Alto microbrewery. The return on investment is dramatic: DEC has sold $5 million of Alpha systems to people who tried them on the Internet.

■ **ADVERTISING:** Some Internet denizens think ads will ruin the neighborhood. An electronic publication zipping around the Internet is the *Adbusters Quarterly.* Its mission? "We will take on the archetypal mind polluters—Marlboro, Budweiser, Benetton, McDonald's, Coke, Calvin Klein, Whittle—and beat them at their own game. We will uncool their billion-dollar images with uncommercials on TV, subvertisements in magazines, and anti-ads right next to theirs in the urban landscape."

Whatever. Most publishers of electronic media acknowledge that just as in the print world, they'll need advertising to subsidize their operations. O'Reilly & Associates, a computer-book publisher in Sebastopol, California, is furthest along in testing how much advertising the Internet will take.

O'Reilly offers a free service called the *Global Network Navigator* on which users encounter two forms of ads. When they call up GNN on their screen, they see a table of contents with a number of headings, including "GNN Marketplace." Clicking on that, they'll find ads from DEC, the

San Francisco law firm Heller Ehrman White & McAuliffe, and Hand in Hand, a children's catalogue retailer in Oxford, Maine. Readers who click on one of the names get further information, like Hand in Hand's on-line offerings of toys, strollers, and cribs.

Users who select the heading "GNN Magazine" find advertising that's more like what they're used to in the print world. The magazine is a quarterly featuring over a

PETER MILLER AND DAVID SPECTOR / J.P. MORGAN
■ **Even blue chips get the news: Morgan employees use a navigational tool called Mosaic to plumb the hidden resources of the Internet.**

dozen Internet-related features that include graphics and the equivalent of a few pages of text; above each headline runs an advertiser's banner. The sole advertiser in the current issue is MIT Press, and the ad simply reads, "MIT Press: *Schools for Thought,* by John T. Bruer." By clicking on the banner, interested readers can learn more about the book, a tome on education, and how to order it. It costs $29.95. But readers who aren't interested have to live with the banner.

A few hardy entrepreneurs have already opened virtual shops on the Internet. At the address *marketplace.com,* customers can browse through Laura Fillmore's On-line BookStore, based in Rockport, Mas-
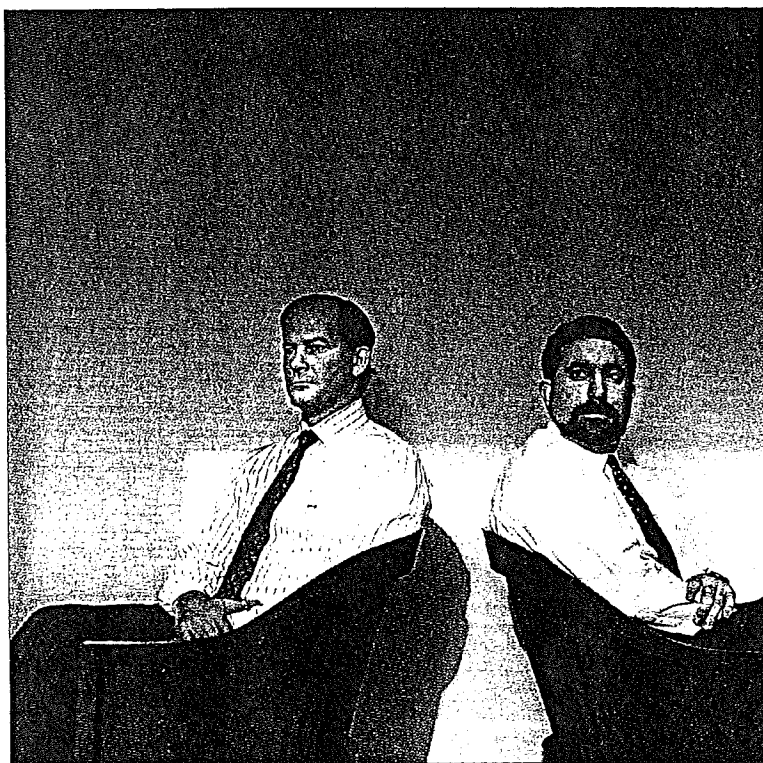
sachusetts; for a fee, they can have books like *The Internet Companion* or *Sex: An Oral History* delivered electronically to their home computers. Fillmore handles payments by asking customers to type in a credit card number. Initially, she says, she had a tough time attracting ordinary readers; her best customers were network providers like EUNet in Amsterdam that license the books and offer them free to subscribers. But she is as tenacious as any real-world shopkeeper: "Eighteen months ago I told myself there was a business here. I'm still telling myself the same thing."

Malls may spring up on the Internet. MecklerMedia, a Westport, Connecticut, publisher of trade journals and organizer of Internet-related conferences, plans to unveil an ambitious commercial space later this year. The so-called MecklerWeb would offer users a menu of services from established trade groups. Say you need a divorce lawyer. You could log on to MecklerWeb, click on the Law option, and get free information on your state's divorce laws from Cornell University's Legal Information Institute, which has already signed on. Returning to the Law menu, you could compare brochures and prices from competing firms.

The experience would be like comparison-shopping at the mall. MecklerMedia plans to operate as both mall owner and system coordinator, helping businesses put their information on the Net. Says general manager Chris Locke: "Right now companies have to devote five man-years to finding out whether the Internet is an opportunity or a rat hole. We want to make the Net a whole lot easier to discover."

That sort of attention to what businesses need is new to the Internet, whose complexity and interactive chaos are still enough to put off most managers. But if you want to be competitive in the networked world, better to jump in than to wait for some "information *super*highway" to reach your front door. There's a highway on your desktop right now. Get on it. ■

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